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A review of *Luperogala* MEDVEDEV & SAMODERZHENKOV, 1989, with description of a new species from Borneo (Coleoptera: Chrysomelidae: Galerucinae)

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ABSTRACT. The species of *Luperogala* MEDVEDEV & SAMODERZHENKOV, 1989 are reviewed. Four species, including one new, are treated: *Luperogala clermonti* (LABOISSIÈRE, 1929) (Vietnam, Laos), *L. mirabilis* MEDVEDEV & SAMODERZHENKOV, 1989 (Vietnam), *L. malayana* (MEDVEDEV, 2004) (comb. nov., from *Liroetis*, Peninsular Malaysia) and *L. mohamedsaidi* sp. nov. (Borneo). *Luperogala clermonti* is recorded for the first time from Laos and excluded from fauna of Peninsular Malaysia and Borneo. Primary type specimens of all species were examined. Photographs and drawings of habitus, male abdomen, last ventrite of the female, claws and male and female genitalia are presented for all species. A key to the species is provided.

Key words. taxonomy, new species, new combination, Coleoptera, Chrysomelidae, Galerucinae, *Luperogala*, Oriental Region, Borneo

INTRODUCTION

The genus *Luperogala* was proposed for two species described from Vietnam: *L. mirabilis* MEDVEDEV & SAMODERZHENKOV, 1989 (type species) and *L. paradoxa* MEDVEDEV & SAMODERZHENKOV, 1989. Recently, WARCHAŁOWSKI (2008) published a description of the male of *Liroetis clermonti* (LABOISSIÈRE, 1929). Based on peculiar structure of aedeagus he also doubted its position in *Liroetis*. BEZDĚK (2012) found *Liroetis clermonti* and *Luperogala paradoxa* conspecific and synonymized them.

Recent investigations of Galerucinae fauna from South-east Asia proved that the distribution of *Luperogala*, until recently known only from Vietnam, is in fact much

wider. Due to the transfer of *Liroetis malayanus* to *Luperogala* and the description of a new species, that area is extended to Peninsular Malaysia and Borneo.

MATERIAL AND METHODS

All measurements were made using an ocular grid mounted on MBS-10 stereo-microscope (at 16× magnification for the body length and 32× magnification for the remaining measurements). Photographs of the habitus were taken by Jan BEZDĚK with Canon EOS 550D digital camera with a Canon MP-E 65 mm objective. Images of the same specimen at different focal planes were combined using Helicon Focus 5.3 software. Photographs of the aedeagi and abdomina were made by Pavel ROMANTSOV with Canon EOS 500D digital camera with combined Canon EF 70-200 mm f/4.0L IS USM and inverted Helios 50mm objectives. Images at different focal planes were combined using Helicon Focus 4.60.3 Pro software.

The material is housed in the following collections:

- BMNH – The Natural History Museum, London, Great Britain (Michael GEISER, Max BARCLAY);
HNHM – Hungarian Natural History Museum, Budapest, Hungary (Otto MERKL);
JBCB – Jan BEZDĚK collection, Brno, Czech Republic;
JVCJ – Jiří VOŘÍŠEK collection, Jirkov, Czech Republic;
LMCM – Lev N. MEDVEDEV collection, Moscow, Russia;
NHMB – Naturhistorisches Museum, Basel, Switzerland (Michael GEISER, late Michel BRANCUCCI);
NMPC – National Museum, Prague, Czech Republic (Jiří HÁJEK);
NMW – Naturhistorisches Museum, Wien, Austria (Harald SCHILLHAMMER);
PRCS – Pavel V. ROMANTSOV collection, St. Petersburg, Russia;
SMNS – Staatliches Museum für Naturkunde, Stuttgart, Germany (Wolfgang SCHALLER);
UKM – Center for Insect Systematics, Universiti Kebangsaan Malaysia, Bangi, Malaysia (Izfa Riza HAZMI);
ZIN – Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia (Alexey G. MOSEYKO);
ZMUH – Zoologisches Institut und Museum, Universität von Hamburg, Hamburg, Germany (Hans RIEFENSTAHL, Kai SCHÜTTE).

Exact label data are cited for type material. A forward slash (/) separates different lines and a double slash (//) different labels of data. Additional remarks are in square brackets: [p] – preceding data are printed, [h] – preceding data are handwritten, [w] – white label, and [r] – red label, x/y - number of males/number of females.

TAXONOMY

***Luperogala* MEDVEDEV & SAMODERZHENKOV, 1989**

Luperogala MEDVEDEV & SAMODERZHENKOV, 1989, Entomofauna, 10: 454 (Type species: *Luperogala mirabilis* MEDVEDEV & SAMODERZHENKOV, 1989).

DESCRIPTION

Body large, elongate, length 10.2-14.0 mm. Coloration: dorsum usually pale brown or, in *L. mirabilis*, elytra metallic blue, legs bicolorous, femora pale brown, tibiae and tarsi black or tibiae brown with darkened apex. Pronotum 1.6-1.8 times as wide as long, covered with fine or large punctures, all margins bordered. Elytra densely covered with small contiguous punctures, almost glabrous, epipleura gradually narrowing and disappearing before apex. Mesotibiae always with apical spur, metatibiae usually (except *L. mirabilis*, see Discussion). Claws appendiculate, appendix variable, small, obtuse to large and sharp. Last two ventrites of males strongly modified, ventrite IV with long sword-like process directed posteriorly. Aedeagus with hypertrophic and complicate dorsal process, always longer than aedeagus, opening with cluster of setae.

DIAGNOSIS

Luperogala belongs to a group of genera characterized by aedeagus with a dorsal process starting near the base of aedeagus and directed anteriorly, as tentatively defined by BEZDĚK (2013). Except *Luperogala*, the group contains the following genera: *Siemssenius* WEISE, 1922; *Liroetis* WEISE, 1889; *Zangia* CHEN, 1976; *Liroetoides* KIMOTO, 1989 and *Coeligetes* JACOBY, 1884.

Luperogala differs from all genera in this group in the presence of a large long sword-like process from posterior margin of abdominal ventrite IV directed posteriorly in male which is missing in other genera. *Luperogala* shares anterior coxal cavities open posteriorly with *Siemssenius*, *Liroetis* and *Zangia* but differs with a very long and complicate dorsal process of aedeagus. Last two ventrites of males in *Luperogala* are strongly modified, while in *Siemssenius*, *Liroetis* and *Zangia* abdomina are relatively simple. *Siemssenius* can be also distinguished by unbordered anterior margin of pronotum (bordered in *Luperogala*). The genera *Liroetoides* and *Coeligetes* differ by anterior coxal cavities closed posteriorly (open in *Luperogala*). *Coeligetes* can be differentiated also by strongly transverse pronotum, ca. 2.0–2.3 times as wide as long (1.6-1.8 times in *Luperogala*).

***Luperogala clermonti* (LABOISSIÈRE, 1929)**

(Figs. 1, 7, 10, 13, 16, 19, 22, 26, 30, 35, 38, 39, 45-48)

Pseudoliroetis clermonti LABOISSIÈRE, 1929, Ann. Soc. Ent. France 98: 282 (Type locality: Tonkin: Chapa); WILCOX, 1973: 478 (catalogue).

Liroetis clermonti: KIMOTO, 1989: 82; WARCHALOWSKI, 2008: 695 (description of male); MEDVEDEV, 2010: 202.

Luperogala clermonti: BEZDĚK, 2012: 394.

Luperogala paradoxa MEDVEDEV & SAMODERZHENKOV, 1989, Entomofauna, 10: 455 (Type locality: Vietnam, prov. Vinhphu, Tamdao); BEZDĚK, 2012: 394 (= *clermonti*).

TYPE MATERIAL

Pseudoliroetis clermonti. Holotype (female, Fig. 45-46), labelled: „Chapa [w, h] // TYPE [red letters, p] / ♀ [w, h] // Pseudoliroetis / Clermonti m [h] / V. Laboissière -- Dét. [w, p] // Le Moul't vend. / via Reinbek / Eing. Nr. 1, 1957 [w, p]“ (in ZMUH).

Luperogala paradoxa. Holotype (male, Fig. 47-48), labelled: „HOLOTYPUS [p] / Luperogala / paradoxa [r, h] // 2. Vietnam, Prov. Vinh-Phu, / Tamdao, 800-1200 m, forest / 12-22.IV.1986, leg. L. MED- / VEDEV, S. GOLOVATCH et al. [w, p]“ (in LMCM); paratypes (1 male, 2 females), labelled: „2. Vietnam, Prov. Vinh-Phu, / Tamdao, 800-1200 m, forest / 12-22.IV.1986, leg. L. MED- / VEDEV, S. GOLOVATCH et al. [w, p] // PARATYPUS [p] / Luperogala / paradoxa [r, h]“ (male in SMNS, 2 female in LMCM).

ADDITIONAL MATERIAL EXAMINED

VIETNAM: Vini, 2.-10.v.1988, Kováčik leg. (2/0 in JBCB and JVCJ); Tam Dao, 8.-22.v.1990, Dudycha leg. (0/1 in JVCJ); Vinh Phu prov., Tam Dao, 27.v.-8.vi.1986, J. Rybníček leg. (0/1 in LMCM); Vinh Phu prov., Tam Dao, 6.-9.v.1990, P. Pacholátko leg. (0/1 in LMCM); Vinh Phu prov., Tam Dao, 800-1200 m, 19.vi.1986, L. Medvedev leg. (0/1 in LMCM). LAOS: Houa Phan prov., Ban Saluei→Phou Pane Mt., 20°12'-13.5'N 103°59.5'-104°01'E, 1340-1870 m, 15.iv.-15.v.2008, Lao collector leg. (1/0 in NMPC).

DISTRIBUTION

Vietnam (LABOISSIÈRE 1929, MEDVEDEV & SAMODERZHENKOV 1989, WARCHALOWSKI 2008, MEDVEDEV 2010, BEZDĚK 2012, present paper) and Laos (this study). The records from continental Malaysia (MOHAMEDSAID 1999b) refer to *Luperogala malayana* (voucher specimens examined) and these from Borneo (MOHAMEDSAID 1998, 1999a, 1999c, MOHAMEDSAID & HOLLOWAY 1999) to *L. mohamedsaidi* sp. nov.

MAIN DIAGNOSTIC CHARACTERS

Habitus as in Figs. 38 and 39. Body length: 11.5-14.0 mm. Body pale brown, legs with black tibiae and tarsi, antennae black with two or three basal antennomeres pale. Vertex without distinct median line. Pronotum with fine punctuation. Meso- and metatibiae with apical spurs (in males very short and poorly visible, in females well developed). Protarsomere I in male elongate, 0.9 times as long as following two tarsomeres combined and three times as long as wide (Fig. 35). Claws in both males and females with small obtuse appendix (Fig. 30). Last ventrite in female with large wedge-shaped incision (Fig. 26).

Male abdomen modified: ventrite IV with large semicircular impression in middle of posterior half, posterior margin with two small teeth at lateral edges of impression; shiny, median appendage starting in the middle of posterior margin of ventrite IV slightly constricted in anterior third, apical half convergent, in lateral view sinuate,

directed ventrally and extreme apex posteriorly. Ventrite V extremely cavitous in middle, lateral parts reduced to two large triangular lateral plates covered with very long setae (Figs. 7, 10, 13, 16, 19).

Aedeagus concave, with widely rounded apex, somewhat extended at apical third. Dorsal process long, vertical, knife-like, in middle with small conical setose brush (Fig. 1).

Spermatheca with large C-shaped cornu, basal part slightly constricted, apex widely rounded, ca. twice wider than nodulus, nodulus transversely ovate, ductus receptaculi without swelling (Fig. 22).

DIAGNOSIS

Luperogala clermonti is similar to *L. malayana* and *L. mohamedsaidi* sp. nov. All three species share similar coloration (body pale brown, legs with black tibiae and tarsi). Both *L. malayana* and *L. mohamedsaidi* sp. nov. differ in pronotum sparsely covered with large deep punctures, distinct median line on vertex and the last ventrite not incised in female, *L. mohamedsaidi* sp. nov. also in completely or almost completely yellow antennae. Males of *L. clermonti* and *L. mohamedsaidi* sp. nov. differ also in different last two ventrites and structure of aedeagus (Figs. 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21).

COMMENTS

Pseudoliroetis clermonti was described by LABOISSIÈRE (1929) based on one female. Later, it was transferred to the genus *Liroetis* by KIMOTO (1989). A description of the male was added by WARCHAŁOWSKI (2008). In the same paper, WARCHAŁOWSKI (2008) doubted its classification in the genus *Liroetis* due to the different structure of aedeagus. The comparison of the drawings and photographs of both aedeagus and abdominal appendices of *Luperogala paradoxa* (see MEDVEDEV & SAMODERZHENKOV 1989) with the description of male of *Liroetis clermonti* in WARCHAŁOWSKI (2008) showed both species identical. Subsequently, BEZDĚK (2012) synonymized both species and transferred *Liroetis clermonti* to *Luperogala*.

***Luperogala malayana* (MEDVEDEV, 2004), comb. nov.**

(Figs. 23, 27, 31, 40, 49, 50)

Liroetis malayanus MEDVEDEV, 2004, Ent. Basil., 26: 330 (Type locality: Malaysia, Tanah Rata Cameron Highlands).

Liroetis clermonti: MOHAMEDSAID, 1999b: 229 (misidentification).

TYPE MATERIAL

Holotype (female, Figs. 49-50), labelled: „Malaysia-Tanah Rata / Cameron Highland / approx. 1450m / 17 March 1988 / leg. G. Hangay [w, p] // Hangay / Collection [w, p] // HOLOTYPUS [p] / Liroetis / malayanus m. [h] / L. Medvedev det. 19 [p] 99 [r, h]“ (in NHMB); 2 paratypes (females), labelled: „Malaysia-Tanah Rata / Cameron Highland / approx. 1450m / 17 March 1988 / leg. G. Hangay [w, p] // Hangay / Col-

lection [w, p] // PARATYPUS [p] / Liroetis / malayanus m. [h] / L. Medvedev det. 19 [p] 99 [r, h]" (in NHMB and LMCM).

ADDITIONAL MATERIAL EXAMINED

PENINSULAR MALAYSIA: Pahang, Ringlet, 04°28'N 101°22'E, 12.-30.iv.2007, V. Kremitovský leg. (0/7 in JBCB); Pahang, Fraser's Hill, 2.ii.1975, OBL (0/1 in UKM); Pahang, Bukit Fraser, 31.viii.-2.ix.2001, Fara & Kamil leg. (0/1 in UKM); Pahang, Cameron Highlands, Tanah Rata vill. env., Gunung Jasar Mt., 04°28.4-7'N 101°21.6-22.1'E, 1470-1705 m, 18.iv.-10.v.2009, J. Hájek leg. (0/1 in NMPC); Pahang, Fraser's Hill, Silverpark Resort Hotel, h~1300m, N 03°42'57" E 101°44'51", 22.iii.-1.iv.2013, A. Azarov leg. (0/1 in PRCS); Pahang, Cameron Highland, Tanah Rata, from illuminated wuite-washed walls, 23-31.iii.1995, O. Merkl leg. (0/1 in LMCM); Selangor, Puchong, 15.vi.1975, CVC (0/1 in UKM); Selangor, Bukit Kutu, 3.300 ft., at light, 1.x.1932, H. M. Pendlebury leg. (0/1 in BMNH); Perak, Larut Hills, 3.700 ft., at light, 5.ii.1932, H. M. Pendlebury leg. (0/1 in BMNH); Kuala Lumpur, without additional data (0/1 in BMNH); Malacca, 1908, without additional data (0/1 in BMNH).

DISTRIBUTION

Peninsular Malaysia (MEDVEDEV 2004, present paper). MOHAMEDSAID (1999b) published *Liroetis clermonti* from provinces Pahang and Selangor, however, we re-identified the voucher specimens as *Luperogala malayana*.

MAIN DIAGNOSTIC CHARACTERS

Habitus as in Fig. 40. Body length: 11.6-13.5 mm (females). Body pale brown, legs with black tibiae and tarsi, antennae black with two, three or four basal antennomeres pale. Vertex with distinct median line. Pronotum sparsely covered with large deep punctures. Meso- and metatibiae with well developed apical spur. Female claws with short sharp appendix reaching half of claw (Fig. 31). Female last ventrite of normal shape with widely obtuse apex (Fig. 27). Male unknown.

Spermatheca with large C-shaped cornu, apex widely rounded, ca. 1.5 wider than nodulus, nodulus transversely ovate, ductus receptaculi without any swelling (Fig. 23).

DIAGNOSIS

In habitus *Luperogala malayana* is closely related to *L. clermonti* and *L. mohamedsaidi* sp. nov. While *L. clermonti* can be easily distinguished by pronotum with fine punctures, vertex without median line, last ventrite with deep wedge-shaped incision and claws with small obtuse appendix, *L. mohamedsaidi* sp. nov. is very similar to *L. malayana*. Separation of both species is complicated by males of *L. malayana* being unknown. Females differ by the coloration of antennae which are completely yellow or with infuscate terminal antennomeres in *L. mohamedsaidi* sp. nov. while black with basal antennomeres pale *L. malayana*, by slightly slenderer tarsi in *L. malayana* and the structure of spermatheca (Figs. 23, 25).

COMMENTS

MEDVEDEV (2004) described this species as *Liroetis malayanus* from three females (holotype and 1 paratype deposited in NHMB and 1 paratype in LMCM). Type specimens from NHMB are in poor condition with missing abdomina and all interior structures of the body (probably caused by larva of Dermestidae). Although only females are known, the transfer to *Luperogala* is supported by the large body size, pronotum with sparse large punctures and the same type of spermatheca as known in other *Luperogala* species.

***Luperogala mirabilis* MEDVEDEV & SAMODERZHENKOV, 1989**

(Figs 2, 5, 8, 11, 14, 17, 20, 24, 28, 32, 36, 41, 42, 51, 52)

Luperogala mirabilis MEDVEDEV & SAMODERZHENKOV, 1989, Entomofauna, 10: 455 (Type locality: Vietnam, prov. Vinhphu, Tamdao); BEZDĚK, 2012: 394.

TYPE MATERIAL

Holotype (male, Figs. 51-52), labelled: „HOLOTYPUS [p] / *Luperogala* / *mirabilis* [r, h] // 2. Vietnam, Prov. Vinh-Phu, / Tamdao, 800-1200 m, forest / 12-22.IV.1986, leg. L. MED- / VEDEV, S. GOLOVATCH et al. [w, p] // вырубка [= clearing] [w, p]“ (in LMCM).

ADDITIONAL MATERIAL EXAMINED

VIETNAM: Vinh Phu Prov., Tam Dao, 1000 m, 17.-30.vi.1999, A. Kallies leg. (0/1 in JBCB); Vini, 2.-10.v.1988, Kováčik leg. (2/0 in JBCB, JVCJ); Vinh Phu Prov., Tam Dao, 6.-9.v.v1990, V. Kubáň leg. (1/0 in PRCS); Vinh Phu prov., Tam Dao, 27.v.-8.vi.1986, J. Rybníček leg. (0/1 in LMCM).

DISTRIBUTION

Vietnam (MEDVEDEV & SAMODERZHENKOV 1989, BEZDĚK 2012).

MAIN DIAGNOSTIC FEATURES

Habitus as in Figs. 41 and 42. Body length: 10.2-13.4 mm. Body orange to brown, elytra metallic green or blue, antennae orange with gradually darkenned last four to six antennomeres, legs orange with tibiae darkenned in apical half, tarsi darkenned. Vertex without distinct median line. Male antennae distinctly longer than body. Pronotum sparsely covered with large deep punctures. Protarsomere I in male short and wide, 0.8 times as long as following two tarsomeres combined and 1.35 times as long as wide (Fig. 36). In both males and females, mesotibiae with short, poorly visible spur, while spur on metatibiae absent. Female last ventrite of normal shape with obtuse subtriangular apex (Fig. 28). Claws with short obtuse appendix (Fig. 32).

Male abdomen modified: posterior margin of ventrite IV with two broad slightly oblique swellings covered with long setae; shiny median appendage starting in middle of posterior margin of ventrite IV convergent, in lateral view only slightly sinuate

and directed posteriorly. Ventrite V is deeply channeled in middle to receive median appendage of ventrite IV (Fig. 5, 8, 11, 14, 17, 20).

Aedeagus concave, subparallel, with obtusangulate apex. Dorsal process thin and long, slightly and gradually extended basally, subapically widened, apex terminated by large umbrella-like structure, oblique in lateral view (Fig. 2).

Spermatheca with large C-shaped cornu, ca. 1.5 wider than nodulus, nodulus transversely ovate, ductus receptaculi with subglobular swelling distally (Fig. 24).

DIAGNOSIS

Luperogala mirabilis is the only species in the genus with metallic green elytra, while all other species have dorsum completely pale brown. In habitus *Luperogala mirabilis* is also similar to *Liroetis viridipennis* Kimoto, 1989 but differs in the coloration of legs which are orange in *Liroetis viridipennis* while the apical halves of tibiae and tarsi are black in *Luperogala mirabilis*. The last visible ventrite in female of *Luperogala mirabilis* is entire while deeply incised in female of *Liroetis viridipennis*.

Luperogala mohamedsaidi sp. nov.

(Figs. 3, 6, 9, 12, 15, 18, 21, 25, 29, 33, 34, 37, 43, 44)

Liroetis clermonti: MOHAMEDSAID, 1998: 260; MOHAMEDSAID, 1999a: 129; MOHAMEDSAID, 1999c: 15; MOHAMEDSAID & HOLLOWAY, 1999: 166 (all misidentifications).

TYPE LOCALITY

Malaysia, Sabah, Trus Madi Mt., N 05°26'35", E 116°27'5".

TYPE MATERIAL

Holotype (male), labelled: „MALAYSIA, N Borneo, Sabah / Trus Madi, Keningau dist., Trus Madi Mt., / 1250m, N 05°26'35", E 116°27'5" / 17-26.III.2012, P. Romantsov [w, p]" (in ZIN); 19 paratypes (1 male and 18 females), same data as in holotype (1 male and 10 females in PRCS, 5 females in LMCM, 3 females in ZIN); 4 paratypes (1 male and 3 females), same data but collected 17.III.2012 (in PRCS); 1 paratype (female), same data but collected 16-18.III.2012 (in PRCS); 2 paratypes (females), same data but collected 5.IV.2013 (in PRCS); 1 paratype (female), same data but collected 8.IV.2013 (in PRCS); 1 paratype (female), same data but collected 24.II.2014 (in PRCS); 3 paratype (females), same data but collected 25.II.2014 (in PRCS); 1 paratype (female), same data but collected 28.II.2014 (in PRCS); 1 paratype (female), labelled: "MALAYSIA, N Borneo, Sabah / Trus Madi, Keningau dist., Trus Madi Mt./ 1230m, N 05°25'39.4", E 116°25'43.2" / 09.IV.2013, P. Romantsov [w, p]" (in PRCS); 1 paratype (female), labelled: "MALAYSIA, N Borneo, Sabah, / ~16 km NW Tambunan, / Crocker Range, h~1660m / N 05°48'47", E 116°20'16" / 13.IV.2013 P. Romantsov leg [w, p]" (in PRCS); 1 paratype (female), labelled: "MALAYSIA, S Borneo, Sabah, / Nabawan dist., ~7 km N Pensiangan vill., h~530m / N 04°35'16", E 116°19'27" / 04 .III.2014 P. Romantsov leg" (in PRCS); 1 paratype (male), labelled: „E-MALAYSIA: Sabah / Kundasang, 1500m / 4.-8.9.1994 / leg. C. L. Li [w, p]" (in

NMW); 1 paratype (female), labelled: „MALAYSIA, Sabah 1993 / 50km E Kota Kinabalu / Crocker Mts., Gg. Emas / 16.-27.4. leg. I. Jeniš [w, p]“ (in NMW); 1 paratype (female), labelled: „Indonesia / Kalimantan-Timur / Apokayan, Long Ampung / 700 m, Sekundärwald / 10.-25.02.97, leg. C. u. P. Zorn [w, p]“ (in JBCB); 1 paratype (female), labelled: „Malaysia, Sabah, Crocker Range / Gunung Emas, 23.05.1998, / J. Kodada & F. Čiampor Lgt. [w, p]“ (in HNHM); 1 paratype (female), labelled: „Borneo 15-27.4.1993 / Sabah Crocker Mt. / Gunung Emas env. / Jeniš & Štrba leg. [w, p]“ (in JVCJ); 1 paratype (female), labelled: „MALAYSIA-Sabah / GUNUNG EMAS 1993 / Crocker Mts. 22.IV. / leg. Jenis+Štrba [w, p]“ (in JVCJ); 1 paratype (female), labelled: „SABAH, Kinabalu Park, / H. Q. (1550m) night [p] / 17-X [h] 198 [p] 7 [h] / Akira Ueda leg. [w, p] // Liroetis / clermonti (Lab.) [h] / det. Mohamedsaid 199 [p] 7 [w, h]“ (in UKM); 1 paratype (female), labelled: „SABAH, Kinabalu Park, / H. Q. (1550m) night [p] / 30-VIII [h] 198 [p] 7 [h] / Akira Ueda leg. [w, p]“ (in UKM); 1 paratype (female), labelled: „SABAH: Gunung / Kinabalu, Sayap / 3-8 Jun 1992 / Zaidi, Ismail, Ruslan [w, p]“ (in UKM); 1 paratype (female), labelled: „Sabah Kundasang / Tmn. Kinabalu / 21.VIII.1988 / Bahiah leg. [w, h]“ (in UKM); 1 paratype (female), labelled: „SABAH: Taman / Kinabalu / 31.VIII.1991 / Salleh - Zaidi [w, h] // at light [w, h]“ (in UKM); 1 paratype (female), labelled: „BORNEO, Sabah / Mount Trus Madi / 14-viii-2005 / Steven Chew leg. / BMNH{E} 2006-36 [w, p]“ (in BMNH); 1 paratype (male), labelled: „SABAH: 1500m / Mt Kinabalu, nr / Kundasang golf / course, 17-20.v.1989 / Primary montane for. [w, p] // K. R. Tuck / BM 1989-129 [w, p]“ (in BMNH). The specimens are provided with additional printed red label: ‘HOLOTYPUS [or PARATYPUS], / *Luperogala* / mohamedsaidi sp. nov., / J. Bezděk, P. Romantsov / & L. Medvedev det. 2013’.

DESCRIPTION

Body length: males 10.4-11.0 mm (holotype 10.5 mm); females 11.8–14.0 mm.

Male (holotype). Body elongate, subparallel, glabrous, lustrous. Coloration: body almost completely strawy yellow, except apices of mandibles, tibiae and tarsomeres black.

Head glabrous, lustrous. Maxillar palpi long, palpomere II elongated, palpomere III slightly expanded, and palpomere IV small and conical. Eyes large, strongly protruding from outline of head, head with eyes 0.88 times as wide as pronotum. Labrum transverse with anterior margin widely rounded, laterally with two long pale setae. Anterior part of head with sparse large punctures. Frontal ridge flat, parallel, apex triangular. Interocular space 1.33 times as wide as transverse diameter of eye. Frontal tubercles large, subpentagonal, impunctate, slightly elevated, with anterior tips divergent. Genae short. Tubercles separated from each other by thin sulcus which continues through vertex. Interantennal space 1.33 times as wide as transverse diameter of antennal socket. Vertex semiopaque, covered with large punctures (sparsely on disc, densely behind frontal tubercles), with distinct median line. Antennae filiform, 0.85 times as long as body, length ratios of antennomeres 1–11 equal 17-7-14-20-21-22-21-21-20-20-24.

Pronotum transverse, 1.6 times as broad as long, widest at anterior third. Surface lustrous, sparsely covered with large punctures (slightly larger and deeper at sides,

middle of disc with finer punctures). Anterior margin slightly concave, posterior margin widely rounded in middle part, laterally straight and oblique, lateral margins subparallel, slightly convergent posteriorly, anterior quarter rounded. Both anterior and posterior margins thinly bordered, lateral margins with wider borders. Anterior angles triangularly prominent, slightly swollen, posterior angles distinct, rectangular. All angles with setigerous pore bearing long pale seta. Lateral margins with row of sparse short setae. Scutellum glabrous, subtriangular, with widely rounded apex, with several large punctures, bordered with distinct line formed by indistinct confluent punctures.

Elytra lustrous, subparallel, 0.75 times as long as body, twice as long as wide (measured at humeral calli), densely covered with small contiguous punctures, almost glabrous, several short setae visible around humeral calli and on lateral and apical slopes. Humeral calli well developed, convex. Elytral apex rounded but with weakly indicated sutural angles. Epipleura moderately wide at anterior quarter, posteriorly gradually narrowing and disappearing before apex, smooth, with sparse short pale setae along whole length. Macropterous.

Anterior coxal cavities open. Ventral surface semiopaque, prosternum glabrous, meso- and metasternum covered with fine punctures and pale setae. Abdomen modified: ventrite IV with two divergent appendages, each appendage wide and parallel-sided with rounded apex, bases of appendages almost connected in middle of ventrite IV, apices of appendages almost reaching posterior margin of ventrite V. Third, shiny median appendage starts in middle of posterior margin of ventrite IV and is directed posteriorly, its apical part is sinuately bent down. Ventrite V trilobed, in middle with deep depression for insertion of median appendage of ventrite IV, apical margin of middle lobe triangularly bent down (Figs. 6, 9, 12, 15, 18, 21).

Legs moderately long and narrow, semiopaque to shiny covered with long pale semiadpressed setae. Protibiae without apical spur, meso- and metatibiae with well developed apical spurs. Protarsomere I subtriangularly elongate, apically slightly dilated, 0.75 times as long as two following tarsomeres combined, slightly wider than protarsomere II (Fig. 37). Length ratios of protarsomeres I–IV equal to 12-8-8-12. Metatarsomere I elongate, apically slightly dilated, as long as two following tarsomeres combined, slightly narrower than metatarsomere II. Length ratios of metatarsomeres I–IV equal to 17-9-8-12. Tarsal claws with long sharp appendix reaching $\frac{3}{4}$ of claw (Fig. 33).

Aedeagus with hypertrophic dorsal process. Apical part subquadrangular, dorsally concave, apical angles sharp and bent down. Middle part dorsally with large globular process, its dorsal hemisphere densely covered with short setae, ventrolaterally with one short process on each side (Fig. 3).

Female. Body wider than in males. Eyes smaller than in males, head with eyes 0.75 times as wide as pronotum. Antennae shorter than in male, 0.67 times as long as body. Interocular space wider, 1.71 times as wide as transverse diameter of eye. Interantennal space 1.42 times as wide as transverse diameter of antennal socket. Pronotum 1.6–1.7 times as broad as long. Tarsal claws with small sharp appendix reaching half of claw (Fig. 34). Female last ventrite of normal shape with obtuse subtriangular apex (Fig. 29). Spermatheca with large C-shaped cornu, ca. twice wider than nodulus, nodulus

transversely ovate, ductus receptaculi with narrow transverse swelling at distal third (Fig. 25).

VARIABILITY

Pronotum of males 1.6–1.7 times as broad as long. Antennae sometimes with infusate apical antennomeres. Tarsi often paler two apical tarsomeres.

DIAGNOSIS

Having uniformly pale dorsum and legs with black tibiae and tarsi *Luperogala mohamedsaidi* sp. nov. is similar to *L. clermonti* and *L. malayana*. From *L. clermonti* it can be easily distinguished by pronotum covered with large deep punctures (fine punctures in *L. clermonti*), vertex with median line (without median line in *L. clermonti*), claws with sharp appendix (small obtuse appendix in *L. clermonti*) and the structures of both male abdomina and aedeagi (Figs. 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21). The females of *L. malayana* (males unknown) are very similar to *L. mohamedsaidi* sp. nov. Both species differ by the coloration of antennae (black with pale basal antennomeres in *L. malayana*, completely yellow or with infusate terminal antennomeres in *L. mohamedsaidi* sp. nov.), by slightly slenderer tarsi in *L. malayana* and by the structure of spermatheca (Figs. 23, 25). The third *Luperogala* species, *L. mirabilis* from North Vietnam, can be easily distinguished by elytra completely metallic greenish-blue.

ETYMOLOGY

Dedicated to Mohamed Salleh MOHAMEDSAID, an excellent specialist in Malayan Chrysomelidae.

DISTRIBUTION

Malaysia (Sabah), Indonesia (East Kalimantan).

COMMENTS

MOHAMEDSAID (1998, 1999a, 1999c) and MOHAMEDSAID & HOLLOWAY (1999) published the specimens of *Liroetis clermonti* from provinces Sabah and Sarawak. We had the opportunity to re-identify the voucher specimens from Sabah and all refer to *L. mohamedsaidi* sp. nov.

A KEY TO IDENTIFICATION OF *LUPEROGALA* SPECIES

1. Head, pronotum, scutellum and underside orange to brown, elytra metallic blue or green. Tibiae brown with darkened apical halves. Male antennae longer than body. Male abdomen and aedeagus as in Figs. 2, 5, 8, 11, 14, 17, 20. Spermatheca as in Fig. 24. Vietnam *L. mirabilis*
- . Body completely yellow or yellowish-brown, tibiae and tarsi completely black. Male antennae shorter or as long as body 2.
2. Pronotum covered with fine and shallow punctures. Vertex without impressed median line. Male antennae approximately as long as body. Claws with small obtuse

- appendix. Male abdomen and aedeagus as in Figs. 1, 7, 10, 13, 16, 19. Female last ventrite with large wedge-shaped incision (Fig. 26). Spermatheca as in Fig. 22. Vietnam, Laos *L. clermonti*
- Pronotum sparsely covered with large and deep punctures. Vertex with impressed median line. Male antennae shorter than body. Claws with sharp appendix ... 3.
3. Antennae completely yellow or with infusate apical antennomeres. Male abdomen and aedeagus as in Figs. 3, 6, 9, 12, 15, 18, 21. Spermatheca as in Fig. 25. Borneo *L. mohamedsaidi* sp. nov.
- Antennae black except basal antennomeres. Spermatheca as in Fig. 23. Peninsular Malaysia *L. malayana*

DISCUSSION

Based on the open coxal cavities and margined prothorax MEDVEDEV & SAMODERZHENKOV (1989) placed *Luperogala* near the genera *Liroetis*, *Pseudoliroetis* and *Cneorane* but without any other specification. BEZDĚK (2012) commented on the generic position of *Luperogala* and one year later (BEZDĚK 2013) he tentatively defined a group of genera characterised by aedeagus with dorsal process starting near the base of aedeagus (comprising *Luperogala*, *Siemssenius*, *Liroetis*, *Zangia*, *Liroetoides* and *Coeligetes*). Until now only two genera are revised based on the study of primary type material: *Liroetoides* by BEZDĚK (2013) and *Luperogala* in the present paper. However, the whole generic group badly needs a comprehensive revision on both generic and species levels.

Three exclusively continental genera *Siemssenius*, *Liroetis* and *Zangia* seem to be very close to each other and their relations need further study. *Siemssenius* differs from *Liroetis* by only one character - unbordered anterior margin of pronotum (thinly bordered in *Liroetis*). The question is if such character is enough to separate the genera, particularly in a view of questioning of stability of other frequently used generic characters such as anterior coxal cavities open/closed posteriorly (e.g. WAGNER 2003, REID & NALLY 2008 or BEENEN & LEE 2010) or split/appendiculate claws (e.g. ZOIA 2007, 2012) in Galerucinae or Eumolpinae. *Zangia* was proposed for a species with a broad and spoon-shaped apical spine on metatibiae, however, the description provides only a very uninformative drawing, thus the validity of *Zangia* also needs verification. Predominantly insular genus *Coeligetes* (occurring also in Peninsular Malaysia) also needs the revision, particularly since there are several undescribed continental species which can prove there is a need for an expanded re-definition of *Coeligetes*.

In *Luperogala* three of important characters are unexpectedly variable. (i) The length of male antennae – in *L. mirabilis* the antennae are longer than the body, in *L. clermonti* ca. as long as the body and in *L. mohamedsaidi* sp. nov. the antennae are distinctly shorter than the body. In females of all four species the antennae reach about half of body length. (ii) In *Luperogala* we detected very surprising differences in the shape of the claws: *L. clermonti* and *L. mirabilis* have claws with very short obtuse appendix (in both males and females), females of *L. malayana* and *L. mohamedsaidi* sp. nov. have claws with short sharp appendix reaching the half of the claw. Males of

L. mohamedsaidi sp. nov. have the inner branch somewhat longer and thus the claws appear to be split (Figs. 30-34). (iii) Apical spurs on meso- and metatibiae are present in both males and females in *L. clermonti*, *L. malayana* and *L. mohamedsaidi* sp. nov. Contrary, in *L. mirabilis* the spur is present only on mesotibiae while absent on metatibiae (same in both sexes). Presence/absence of metatibial spurs in *Luperogala* may cast doubt on its importance as a generic character (similarly as the above mentioned anterior coxal cavities or claws). However, it is necessary to note that the tibial spurs in some *Luperogala* are very short and visible only in direct ventral view (not visible from lateral or oblique views) and we also cannot exclude that in some specimens the spurs could simply be broken. This topic needs further study in the whole genus-group.

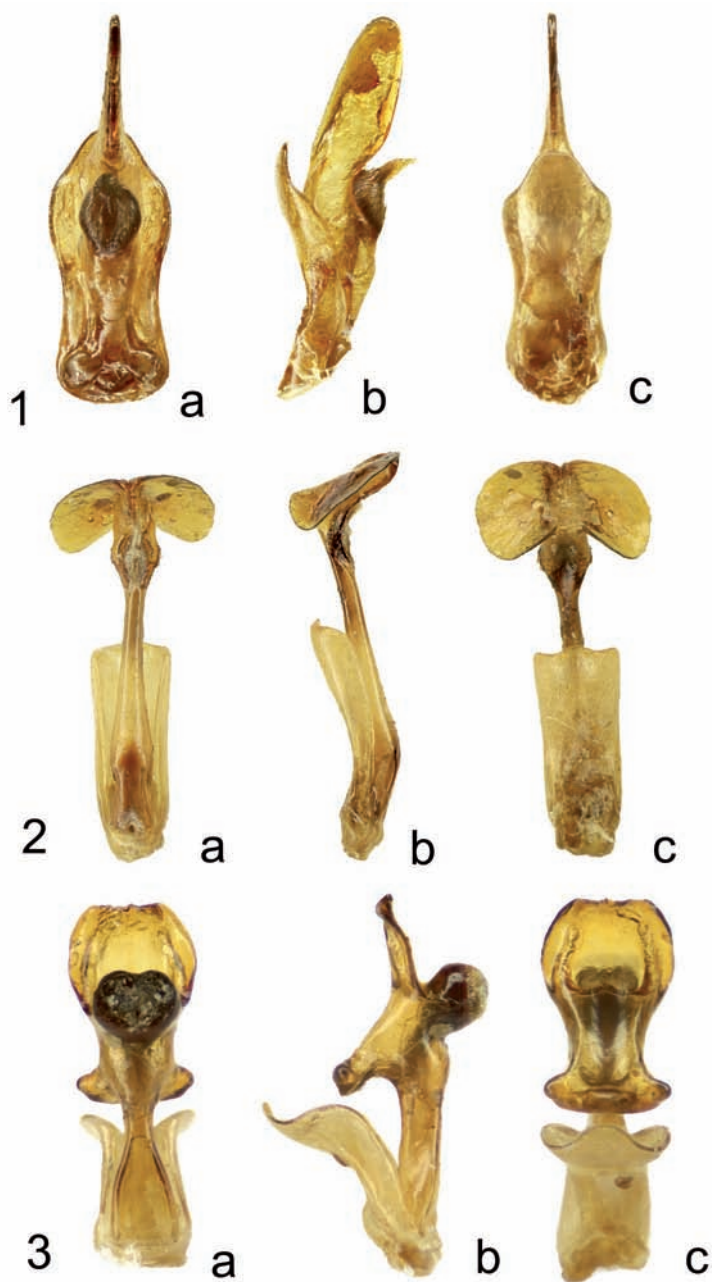
ACKNOWLEDGEMENTS

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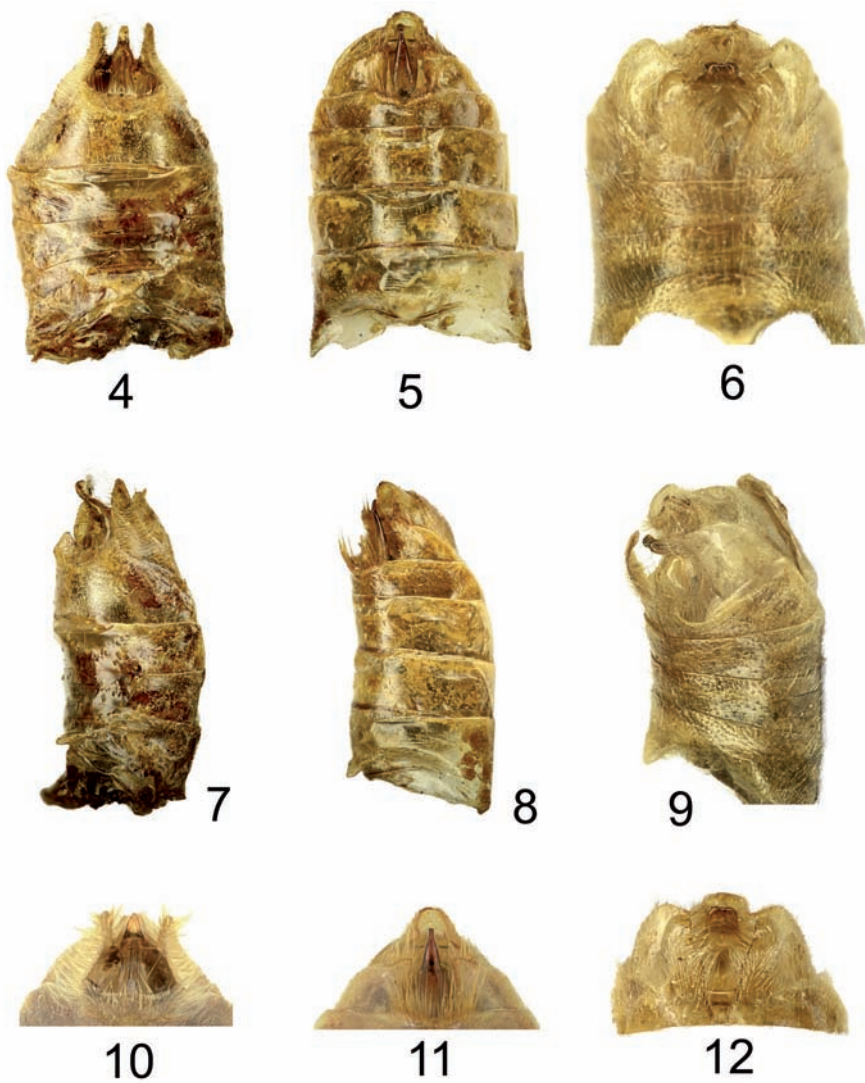
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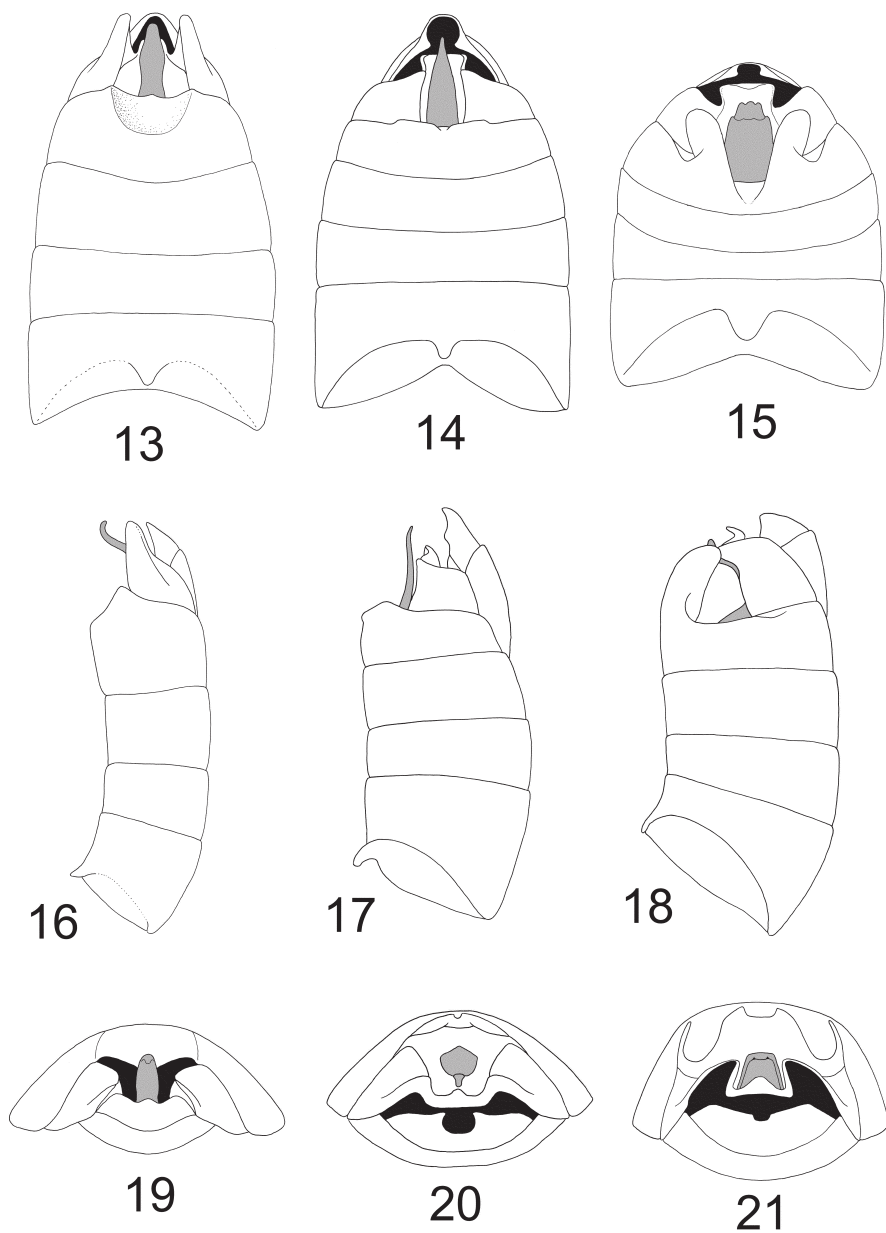
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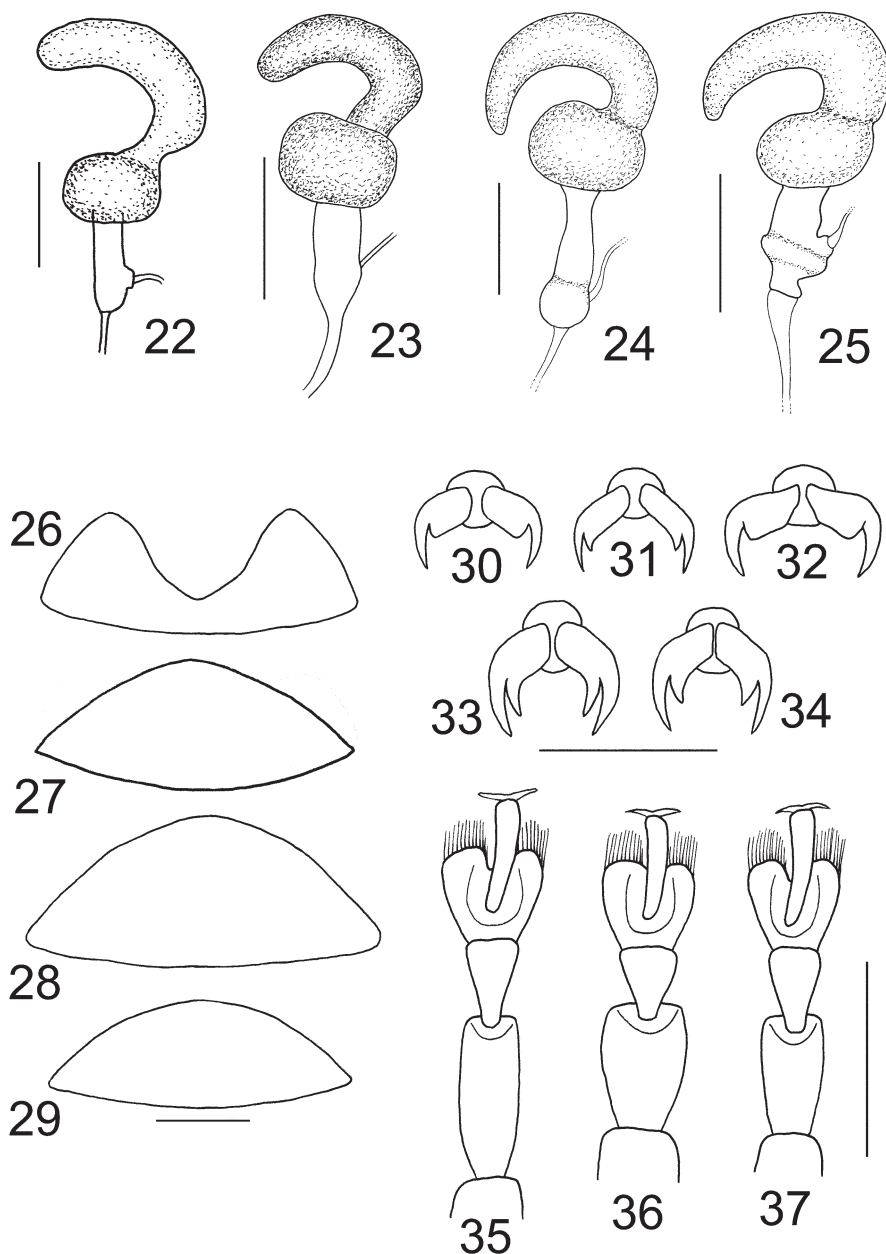
1-3. Aedeagus (a – dorsal view, b – lateral view, c – ventral view): 1 – *Luperogala clermonti*, 2 – *L. mirabilis*, 3 – *L. mohamedsaidi* sp. nov.



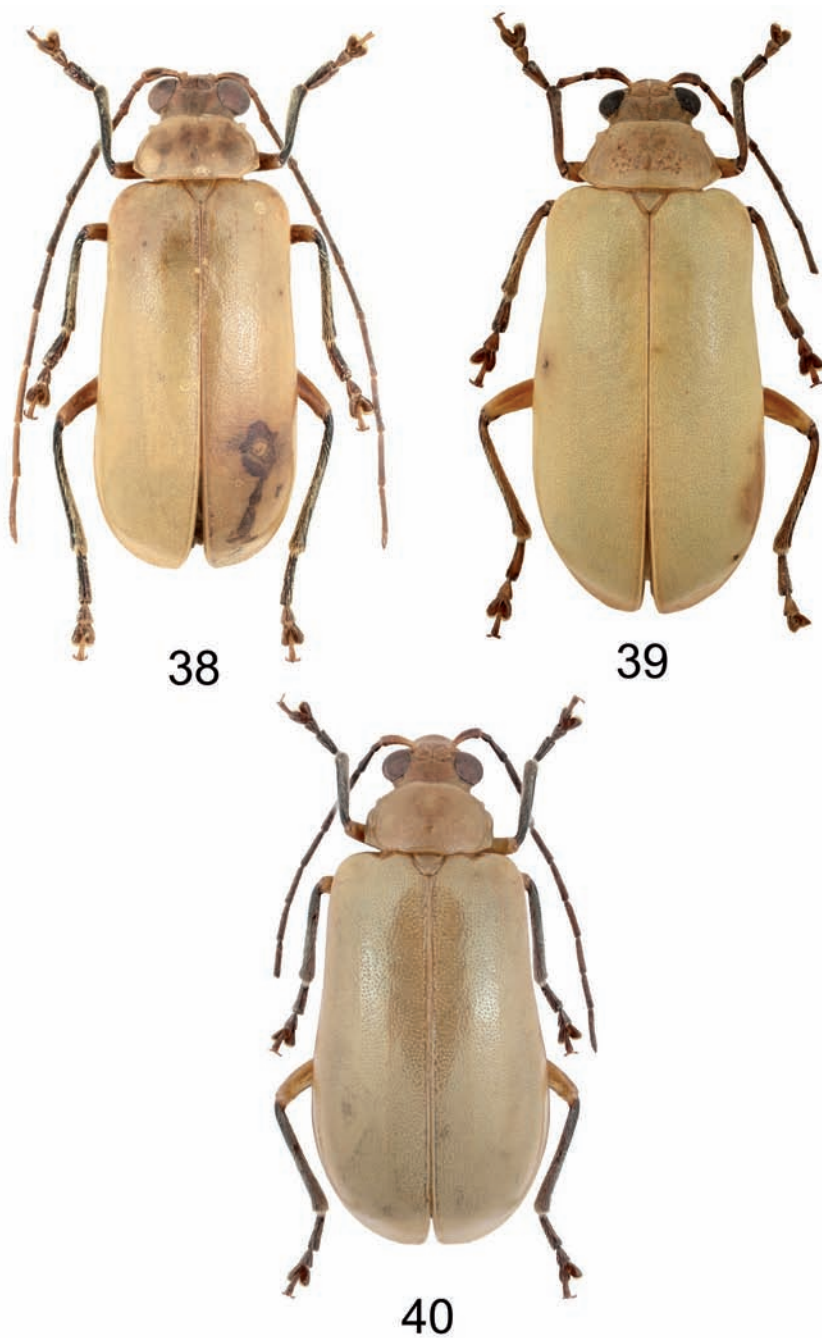
4-12. Male abdomen (4-6 – ventral view, 7-9 – lateral view, 10-12 – ventral view in detail): 4, 7, 10 – *Lu-perogala clermonti*, 5, 8, 11 – *L. mirabilis*, 6, 9, 12 – *L. mohamedsaidi* sp. nov.



13-21. Male abdomen drawings, sword-like process in grey (13-15 – ventral view, 16-18 – lateral view, 19-21 – caudal view): 13, 16, 19 – *Luperogala clermonti*, 14, 17, 20 – *L. mirabilis*, 15, 18, 21 – *L. mohamedsaidi* sp. nov.



22-37. *Luperogala* details (22-25 – spermatheca, 26-29 – female last ventrite, 30-34 – claws, 35-37 – male protarsus): 22, 26, 30, 35 – *Luperogala clermonti*, 23, 27, 31 – *L. malayana*, 24, 28, 32, 36 – *L. mirabilis*, 25, 29, 33 (male), 34 (female), 37 – *L. mohamedsaidi* sp. nov. Scale bars: 1 mm for Figs. 26-29 and 35-37, 0.5 mm for Figs. 30-34, 0.25 mm for Figs. 22-25



38-40. Habitus: 38 – *Luperogala clermonti* (male, 11.7 mm), 39 – *L. clermonti* (female, 13.2 mm), 40 – *L. malayana* (female, 12.1 mm)



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41-44. Habitus: 41 – *Luperogala mirabilis* (male, 10.4 mm), 42 – *L. mirabilis* (female, 13.5 mm), 43 – *L. mohamedsaidi* sp. nov. (male, paratype, 11.0 mm), 44 – *L. mohamedsaidi* sp. nov. (female, paratype, 13.4 mm)



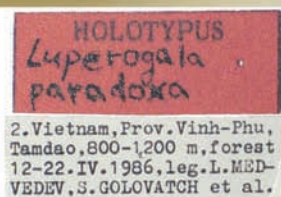
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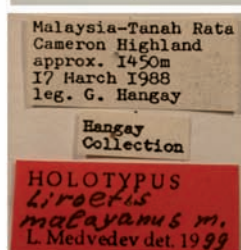
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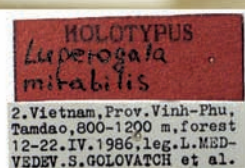
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45-52. Type specimens and their labels: 45-46 – holotype of *Pseudoliroetis clermonti* (female), 47-48 – holotype of *Luperogala paradoxa* (male), 49-50 – holotype of *Liroetis malayanus* (female), 51-52 – holotype of *Luperogala mirabilis* (male)